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IN THE US PATENT AND TRADEMARK OFFICE

Application No.: **10/619,287**

Filing date: **07/15/2003**

First Named Inventor: **Wen C. Huang**

Application Title: **DIRECT WRITE PROCESS AND APPARATUS**

Examiner: **Charles R. Kasenge**

Art Unit: **2125**

June 16, 2007

Office of Petitions
Commissioner for Patents, P. O. Box 1450
Alexandria, Virginia 22313-1450

Subject: **Renewed Petition** under MPEP 711.03(c) II and 37 CFR § 1.181, To Withdraw
Holding of Abandonment Based On Failure To Receive Office Action

Dear Sir:

Responsive to the Office's *DECISION ON PETITION* mailed on 05/01/2007, I hereby request the Office to please reconsider my petition to withdraw holding of abandonment based on failure to receive the original *Notice of Allowance and Fees*.

The applicant hereby attests to the fact that:

- (1) the Office communication concerning allowance and issue fee was not received by the applicant; and
- (2) a search of the file jacket and docket records indicates that the Office communication was not received.

The following items were found in the file jacket:

- 1) Docket sheets (two pages) – herein submitted as Attachment 1.
- 2) Original patent application file – the first page, entitled Utility Patent Application Transmittal, is herein submitted as Attachment 2.
- 3) USPTO filing receipt (received 10/20/2003) – Attachment 3.
- 4) Office Action Summary (received 10/01/2006) – Attachment 4.
- 5) The Applicant's Response to Office Action Summary (mailed 10/10/2006) – Attachment 5.
- 6) Notice of Abandonment (received 03/05/2007) – Attachment 6.
- 7) A letter of petition "to Withdraw Holding of Abandonment Based on Failure to Receive Office Action," faxed to USPTO 1-571-273-8300 (faxed on 03/07/2007) – Attachment 7.
- 8) A letter of petition for "Revival of an application for patent abandoned unintentionally under 37 CFR 1.137(b)," (along with patent issue/publication fees were mailed out on 04/09/2007) – a copy of letter of petition herein submitted as Attachment 8.
- 9) USPTO' Decision on Petition (request to withdraw holding of abandonment, Item No. 7 of this list) – Attachment 9.

These records indicate that no Office communication was received between October 10, 2006 and March 5, 2007.

The Applicant visited PAIR-DIRECT.USPTO.gov on approximately March 3, 2007, and was shocked to realize that the subject patent application was abandoned. I immediately called the patent

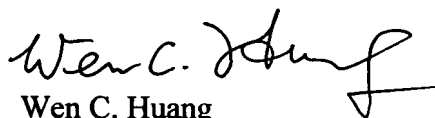
examiner, Mr. Charles Kasenge, to express my concerns and ask for his advice.

Upon receipt of the official *Notice of Abandonment*, I faxed a letter of petition "to Withdraw Holding of Abandonment Based on Failure to Receive Office Action (under MPEP 711.03(c)II and 37 CFR §1.181," on March 7, 2007. Being uncertain if the Office had received this faxed letter or not and in the interest of time, I submitted a letter of petition for "Revival of an application for patent abandoned unintentionally under 37 CFR 1.137(b)," along with patent issue/publication fees, on 04/09/2007.

Despite the fact that I have applied for more than 20 patents in the last 8 years or so, I do NOT have a history of not receiving Office actions.

Your approval of my request to withdraw holding of Abandonment shall be greatly appreciated. As indicated earlier, I have already paid the patent issue and publication fees.

Respectfully,

A handwritten signature in black ink, appearing to read "Wen C. Huang". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Wen C. Huang
9436 Parkside Drive,
Centerville, Ohio 45458
(937) 903-0136



10/619,287
07/15/2003

attachment #1

Direct Write Process and Apparatus

1. Application Mailed 07/15/2003

2. USPTO filing Receipt 10/20/2003
Appl. No. 10/619,287
Filing Date established, 07/15/2003

3. Office Action Summary, Received 10/01/2006

Comments: Claims 1-3 allowed

32, 39 & 40 rejected

33-38, 41 and 42 Objected to.

4. Response to Office Action Summary, Mailed 10/10/2006
Asked for reconsideration

Note: Visited PAIR-DIRECT.USPTO.GOV 03/03/2007
PAIR Record indicated "Abandonment for failure
to pay issue fee"

Called pat. examiner Charles Kasenge

5. Notice of Abandonment, Received 03/05/2007

6. Petition to Withdraw Holding of Abandonment
under MPEP 711.03(C)II and 37 CFR § 1.181

Faxed to 1-571-273-

7. "Revival of an Application for patent abandonment
unintentionally under 37 CFR 1.137(b)
+ PTO/SB 64 + issue fee, etc. Mailed 04/09/07

8. "Decision on Petition"
dated 05/01/2007
from Office of Petitions

Received 05/05/2007

9. Cover letter requesting for
"Renewed Petition"

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

Attorney Docket No.

First Inventor

Wen C. Huang

Title

DIRECT WRITE PROCESS AND APPARATUS

Express Mail Label No.

(Only for new nonprovisional applications under 37 CFR 1.53(b))

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages **35**]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets **6**]
5. Oath or Declaration [Total Pages **1**]
- a. ☒ Newly executed (original or copy)
Copy from a prior application (37 CFR 1.63 (d))
- b. ☐ (for continuation/divisional with Box 18 completed)
- i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

ADDRESS TO:Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
- a. ☐ Computer Readable Form (CRF)
- b. Specification Sequence Listing on:
- i. ☐ CD-ROM or CD-R (2 copies); or
- ii. ☐ paper
- c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement of Power of Attorney (when there is an assignee)
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☐ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. ☐ Other: _____

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No.: _____

Prior application information:

Examiner _____

Group Art Unit: _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

Customer Number or Bar Code Label

or ☒

Correspondence address below

Name

Wen C. Huang

Address

2902 28 AVE, S.W.

City

FARGO

State

ND

Zip Code

58103

Country

USA

Telephone

701-298-8415

Fax

701-476-0368

Name (Print/Type)

Wen C. Huang

Registration No. (Attorney/Agent)

Signature

Wen C. Huang

Date

7/05/2003

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Attachment # 2

Attachment # 3



UNITED STATES PATENT AND TRADEMARK OFFICE

JUN 21 2007

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPL NO.	FILING OR 371 OF DATE	PART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
10/619,287	07/15/2003	2125	791		6	47	4

Wen C. Huang
2902 28 AVE, S.W.
FARGO, ND 58103

CONFIRMATION NO. 9971

FILING RECEIPT



OC000000011050077

Date Mailed: 10/16/2003

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Wen C. Huang, Fargo, ND;

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 10/15/2003

Projected Publication Date: 01/20/2005

Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

Direct write process and apparatus

Preliminary Class

700

Attachment # 4



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,287	07/15/2003	Wen C. Huang		9971

7590 09/26/2006

Nanotek Instruments Inc
9436 Parkside Dr
Centerville, OH 45458

EXAMINER

KASENGE, CHARLES R

ART UNIT PAPER NUMBER

2125

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

10/619,287

HUANG, WEN C.

Examiner

Art Unit

Charles R. Kasenge

2125

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) 43-47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-31 is/are allowed.
- 6) ☒ Claim(s) 32, 39 and 40 is/are rejected.
- 7) ☒ Claim(s) 33-38, 41 and 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/15/03.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date 9/18/06.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.



Attachment # 5

IN THE US PATENT AND TRADEMARK OFFICE

Application No.: 10/619,287

Filing date: 07/15/2003

First Named Inventor: Wen C. Huang

Application Title: DIRECT WRITE PROCESS AND APPARATUS

Examiner: Charles R. Kasenge

Art Unit: 2125

Mailed October 10, 2006 ✓

Commissioner of Patents and Trademarks

P. O. Box 1450

Alexandria, Virginia 22313-1450

Sir:

The Office Action mailed 09/26/2006 indicated that (a) claims 1-31 are allowed, (b) claims 32, 39 and 40 are rejected, and (c) claims 33-38, 41 and 42 are objected.

Thank you for approving claims 1-31. May I please request that the Office re-consider the aforementioned claim rejection and objection for the following justifications:

(1) The Office Action stated that "*Claim 32 is rejected under 35 U.S.C. 102(b) as being anticipated by Jang U.S. Patent 6,180,049.*" May I humbly say that the apparatus disclosed by Jang and Yang (my colleagues at Nanotek Instruments, Inc., the same assignee as the present invention) is patently distinct and different from the apparatus defined in claim 32 of my instant invention. My invention is NOT an obvious extension of Jang and Yang's earlier invention, further explained as follows:

(A) Jang and Yang (US 6,180,049) disclosed an apparatus to fabricate a 3-D object that involves using a laser beam to induce a chemical reaction of a **vapor** phase material, resulting in chemical vapor deposition (CVD) of a material onto a target surface in a point-by-point and layer-by-layer manner. The most critical components of Jang and Yang's apparatus are a phase-change chamber to accommodate a small amount of **organic vapor** and a laser beam to convert an amount of the organic vapor in the laser

1 beam path to a solid phase. In contrast, my invented apparatus comprises a liquid
dispensing device to dispense small **liquid droplets** (not organic vapor) in a highly
controllable manner onto a target surface and a laser beam is not necessarily required in
my apparatus. In my apparatus, the droplet sizes are controlled by the nozzle orifice size
and the impending liquid chamber pressure. By contrast, the deposited solid phase size in
6 Jang and Yang's apparatus depends upon the laser beam size. These differences can be
understood from claim 1 of Jang and Yang's patent and claim 32 of my application,
shown respectively in the following:

Jang and Yang (US 6,180,049):

11 1. Solid freeform fabrication apparatus for making a three-dimensional object,
comprising:

(a) a target surface;

(b) a material deposition sub-system comprising

16 a fluid phase delivery device, disposed a distance from said target surface, said device
comprising (1) a phase change chamber having a discharge opening of a predetermined
size smaller than 1 mm in diameter on one side of said chamber proximal said target
surface, (2) a multiplicity of flow channels with each channel having first and second
ends, said first end being supplied with a precursor fluid phase composition and said
second end having an orifice of a predetermined size to supply said fluid phase

21 composition therethrough into said phase change chamber, and (3) flow control means
located in control relation to each of said channels for regulating the flow of said fluid
phase composition through said orifice into said phase chamber and then dispensing said
fluid phase composition through said discharge opening; said dispensed fluid phase
composition moving from said opening toward said target surface, forming a narrow
26 travel path;

a focused energy beam, disposed a distance from said fluid phase delivery device, and
operative to intersect said travel path producing a phase change zone in which said fluid
phase composition undergoes a chemical reaction and/or physical transition for
depositing materials onto said target surface;

1 (c) motion devices coupled to said target surface and said material deposition sub-system
for moving said deposition sub-system and said target surface relative to one another
along selected directions in a plane defined by first and second coordinate directions and
in a third coordinate direction orthogonal to said plane to form said deposition materials
into a three-dimensional shape.

6

In my application:

11 32. A direct write apparatus for fabricating a desired circuit component onto a substrate
surface of a microelectronic device according to a computer-aided design (CAD), said
apparatus comprising:

- 16 (a) a support member for supporting thereon said device substrate;
- (b) a fluid material delivery assembly comprising a chamber at a distance from said
support member for containing a precursor fluid material under a substantially
~~constant but adjustable pressure differential~~ relative to the ambient pressure;
- 21 (c) an inkjet-based dispensing head in flow communication with said chamber, said
head comprising on one end at least a discharge orifice of a predetermined size and
a valve means in control relation to said at least a discharge orifice for dispensing
droplets of said precursor fluid material through said orifice onto said substrate
surface; and
- 26 (d) machine control means in electronic communication with a computer and in
control relation to both said support member and said dispensing head for
generating control signals in response to coordinates of said design of the device
and for controlling the position of said dispensing head relative to said support
member in response to said control signals to control dispensing of said precursor
material for fabricating said component.

As one can see, the above two claims from two respective inventions are so vastly different.
Those skilled in the art would not have anticipated one from another.

1 (B) It is well-known in the field of solid freeform fabrication (SFF) or direct write (DW)
technology that a typical 3-D fabrication or direct write apparatus comprises a material
delivery device, a support member (target surface), and a motion control system. Any
difference between two apparatus is almost always related to how the object- or
component-forming material is delivered and deposited at a desired spot. It is true that
6 both my apparatus and Jang and Yang's apparatus have a material delivery device, a
support member (target surface), and a motion control system. However, this is the only
similarity between the two apparatus in question. In my apparatus, I had to design an
intricate liquid dispensing device to eject liquid droplets out of a nozzle orifice at a
constant pressure differential to ensure consistent particle sizes and droplet formation
11 rates. In my apparatus, a constant pressure differential is the key to the success of the
apparatus and the related process for building a 3-D object. By contrast, Jang and Yang
used a phase-change chamber to somehow confine an organic vapor in this chamber,
which can be smaller or bigger since the deposit solid phase size is controlled by the laser
beam size, not by the chamber size. Indeed, a material delivery and deposition sub-system
16 was typically what distinguished one SFF or DW system from another according to the
patent literature published in the last 15 years.

(2) The Office Action further stated that "Claims 33-38 and 41-42 objected to as being dependent
upon a rejected base claim, but would be allowable if re-written in independent form including all
of the limitations of the base claim and any intervening claims." Since claim 32 now appears to be
21 allowable, claims 33-38 and 41-42 are also allowable.

(3) Since claim 32 now appears to be allowable, claims 39 and 40 (which depend upon claim 32)
should also be allowable. It may be noted that claims 39 and 40 provide a roll-to-roll capability of
mass-producing desired active, passive, and other functional components to make an integrated
circuit (IC) or a micro-electronic device such as a sensor, actuator, or micro-electro-mechanical
26 system (MEMS). Without a mass production capability, it would be difficult for an IC or MEMS
product to be market-competitive. The apparatus of Jang and Yang did not contain such a highly
desirable feature.

1 Your favorable consideration of this request shall be greatly appreciated.

Respectfully submitted,

Wec C. Huang

9436 Parkside Drive

Centerville, Ohio 45458

6 (937) 291-0218

1 **What is claimed:**

1. (Currently amended) A direct write process for fabricating a desired circuit component onto a substrate surface of a microelectronic device according to a computer-aided design (CAD), said process comprising:

- 6 (a) providing a support member by which said device substrate is supported while said component is being fabricated;
- (b) providing a chamber for containing a precursor fluid material under a substantially constant pressure differential relative to the ambient pressure, said precursor fluid material having a viscosity no less than 10 cps centipoises (cps);
- 11 (c) operating an inkjet-based single-orifice or multiple-orifice dispensing head for dispensing and depositing minute droplets of said precursor fluid material through at least one discharge orifice onto said substrate surface, said dispensing head having valve means in control relation to said dispensing head for switching said head on and off on demand;
- (d) operating a material treatment means to convert said deposited precursor material to said desired component; and
- 16 (e) operating machine control means for generating control signals in response to coordinates of said CAD and for controlling the position of said dispensing head relative to said support member or said substrate in response to said control signals to control dispensing and depositing of said precursor material to form said component of a desired shape and dimension on said substrate surface.

21 2. (Original) The process of claim 1 wherein said substantially constant pressure differential is variable and is varied by a method comprising:

- operating a pump means to deliver said precursor fluid material from a reservoir to said chamber, wherein said valve means, when switched on, allows said fluid material to be dispensed through said dispensing head and, when switched off, allows at least a portion
- 26 of said fluid material to flow back to said reservoir through a flow channel; and
- operating a flow-regulating means to adjust a fluid material back-flow rate through said flow channel for maintaining a desired fluid material pressure inside said chamber.

1 3. (Original) The process of claim 2 wherein said pump means comprises a device selected
from the group consisting of a gear pump, an extruder, a piston, a positive displacement pump, an
air pump, a motor-driven linear motion device, an actuator, or combinations thereof.

6 4. (Original) The process of claim 2 wherein said flow-regulating means comprises a needle-
like valve to adjust an effective cross-section of said flow channel through which said at least a
portion of fluid material flows back to said chamber.

5. (Original) The process of claim 2 wherein said flow-regulating means comprises a spring.

6. (Original) The process of claim 4 wherein the position of said needle-like valve is adjustable
and is adjusted by using an actuator means prior to or in real time during step (c).

11 7. (Original) The process of claim 1 or 2, wherein said material treatment means is selected
from the group consisting of a ventilation fan, a vacuum pump, an air blower, a cooling device, a
heater, an ultraviolet light source, an infrared source, a laser beam, an electron beam, an X-ray
source, a Gamma-ray source, an ion beam source, a microwave source, an induction generator,
and combinations thereof.

16 8. (Original) The process of claim 1 or 2, wherein said valve means comprises a pneumatically
operated valve or a solenoid valve.

9. (Original) The process of claim 1 or 2, wherein said pressure differential exceeds one pound
per square inch (psi) and its actual value is predetermined in accordance with the precursor fluid
viscosity.

21 10. (Original) The process of claim 1 or 2, wherein said motion control means include servo
means for indexing and positioning said dispensing head relative to said support member in at
least two dimensions.

1 11. (Original) The process of claim 10, wherein said servo means provide indexing and positioning in a third dimension.

12. (Original) The process of claim 1 wherein said constant pressure differential is variable with the variations being achieved by using a compressed air source, a back-flow channel and a pressure-regulating needle valve.

6 13. (Original) The process of claim 1, 2, or 12, wherein said precursor fluid material comprises a volatile liquid ingredient selected from the group consisting of water, ethanol, methanol, acetone, and mixtures thereof.

11 14. (Original) The process of claim 1, 2, or 12, wherein said precursor fluid material comprises an ingredient selected from the group consisting of a polymeric, organic, organo-metallic, ceramic, glass, carbonaceous, metallic material, and combinations thereof.

15. (Original) The process of claim 1, 2, or 12, wherein said precursor fluid material is in a form or physical state selected from the group consisting of a melt, a solution, a suspension, a sol-gel, or a colloidal fluid.

16 16. (Original) The process of claim 1, 2, or 12, wherein said circuit component comprises a material selected from one of the following groups of materials:

- (A) Metals, including silver, nickel, gold, copper, chromium, titanium, aluminum, platinum, palladium, and alloys thereof;
- (B) Ceramics, including alumina (Al_2O_3), silica, glasses, and mixtures thereof;
- 21 (C) Dielectrics, including alumina, magnesium oxide (MgO), yttrium oxide (Y_2O_3), zirconium oxide (ZrO_2), and cerium oxide (CeO_2);
- (D) Ferroelectrics, including barium titanate (BaTiO_3), strontium titanate (SrTiO_3), lead titanate (PbTiO_3), lead zirconate (PbZrO_3), potassium niobate (KNbO_3), strontium bismuth tantalate ($\text{SrBi}_2\text{Ta}_2\text{O}_9$), $(\text{Ba,Sr})\text{TiO}_3$, and solid solution stoichiometric variations thereof;
- (E) Piezoelectrics, including quartz, AlN , and lead zirconate titanate;

- 1 (F) Ferrites, including yttrium iron garnet ($\text{Y}_3\text{Fe}_5\text{O}_{12}$), barium zinc ferrite ($\text{Ba}_2\text{Zn}_2\text{Fe}_{12}\text{O}_{19}$),
hexagonal ferrites, barium ferrite, spinel ferrites, nickel zinc ferrites, manganese zinc
ferrite, and magnetite (Fe_3O_4);
- (G) Electro-optical ceramics, including lithium niobate (LiNbO_3), lithium tantalate (LiTaO_3),
cadmium telluride (CdTe), and zinc sulfide (ZnS);
- 6 (H) Ceramic superconductors, including $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (YBCO), $\text{Tl}_2\text{CaBa}_2\text{Cu}_3\text{O}_{12}$,
 $\text{La}_{1.4}\text{Sr}_{0.6}\text{CuO}_3$, BiSrCACuO , BaKBiO , and halide doped fullerenes;
- (I) Chalcogenides, including SrS , ZnS , CaS , and PbS ;
- (J) Semiconductors, including Si , Ge , GaAs , and CdTe ;
- (K) Phosphors, including SrS:Eu , SrS:Ce , ZnS:Ag , $\text{Y}_2\text{O}_3\text{:Eu}$, and $\text{Zn}_2\text{SiO}_4\text{:Mn}$;
- 11 (L) Transparent conductive oxides, including indium tin oxide, zinc oxide, tin oxide, indium
oxide, and mixture thereof; and
- (M) Bio- and chemical sensing elements.

17. (Original) The process of claim 1, 2, or 12, wherein said precursor fluid has a viscosity no less than 20 cps.

16 18. (Original) The process of claim 1, 2, or 12, wherein said valve means of said inkjet-based
dispensing head comprises a mechanism selected from the group consisting of a piezo-electric
element, a thermal actuation element, and a solenoid valve.

19. (Original) A direct write process for fabricating at least one desired circuit component onto
a substrate surface of a microelectronic device according to a computer-aided design (CAD), said
21 process comprising:

- (a) providing a supply of a first precursor fluid material, with a viscosity no less than 10 cps,
under a substantially constant but variable pressure differential relative to ambient
pressure;
- 26 (b) dispensing said first precursor fluid material from at least an inkjet-based dispensing head
onto said substrate surface of said device supported by a support member;
- (c) during said dispensing step, moving said dispensing head and said support member or said

1 substrate relative to one another in a plane defined by first and second directions to form
said first precursor material into a desired pattern according to said design; and

- (d) concurrent with or subsequent to said dispensing and moving steps, operate a material
treatment means to convert said first deposited pattern of precursor material into at least a
portion of said at least one desired circuit component.

6 20. (Original) The process of claim 19, wherein said substantially constant but variable
pressure differential is varied by a method comprising:

operating a pump means to deliver said precursor fluid material from a reservoir to said
chamber, wherein said valve means, when switched on, allows said fluid material to be
dispensed through said dispensing head and, when switched off, allows at least a portion
11 of said fluid material to flow back to said reservoir through a flow channel; and
operating a flow-regulating means to adjust a fluid material back-flow rate through said flow
channel for maintaining a desired fluid material pressure inside said chamber.

21. (Original) The direct write process of claim 19 or 20, further comprising repeating steps
(a) through (d) to dispense and deposit a second precursor fluid material of a second desired
16 pattern onto said substrate surface and converting said second deposited precursor fluid material
onto at least a second portion of said at least one component or a second component of said
device.

22. (Original) The direct write process of claim 19 or 20, further comprising repeating steps
(a) through (d) to deposit multiple components onto said substrate surface to form a first layer of
21 said device.

23. (Original) The direct write process of claim 22, further including the steps of forming
multiple layers of components on top of one another by repeated dispensing and converting of
said precursor fluid materials as said dispensing head and said support member are moved relative
to one another in one direction parallel to said plane, with said dispensing head and said support
26 member being moved away from one another in said third direction by a predetermined layer

1 thickness after each preceding layer has been formed.

24. (Original) The direct write process of claim 19 or 20, further including the steps of:

creating a geometry representation of said device on a computer, said

geometry representation including a plurality of segments or data points defining said device;

6 generating programmed signals corresponding to each of said segments or data points in a predetermined sequence; and

moving said dispensing head and said support member relative to one another in response to said programmed signals.

11 25. (Original) The direct write process of claim 19 or 20, wherein said moving step includes the step of moving said dispensing head and said support member relative to one another in a direction parallel to said plane according to a first predetermined pattern to dispense said precursor fluid material at a rate for forming an outer boundary of a component on said device substrate surface, said outer boundary defining an exterior surface of said component.

16 26. (Original) The direct write process of claim 25, wherein said outer boundary defines an interior space in said component and wherein a fluid material pressure is increased to a higher pressure level, and said moving step further includes the step of moving said dispensing head and said support member relative to one another in said direction parallel to said plane according to at least one other predetermined pattern to fill said interior space with said material at a higher rate.

21 27. (Original) The direct write process of claim 26, further comprising the steps of creating a geometry representation of said device on a computer, said geometry representation including a plurality of segments or data points defining said object, and generating programmed signals corresponding to each of said segments or data points in a predetermined sequence, wherein said programmed signals determine said movement of said dispensing head and said support member relative to one another in said first predetermined pattern and said at least one other predetermined pattern.

26

1 28. (Original) The direct write process of claim 1, 2, 19, or 20, wherein said substrate is selected from the group of flexible materials consisting of a plastic, elastomer, fabric, paper, composite, and combinations or mixtures thereof.

29. (Original) The direct write process of claim 28, wherein said substrate is prepared in a roll form.

6 30. (Original) The direct write process of claim 28, further comprising continuously or intermittently moving said substrate from a roll of substrate supply disposed at one side of said support member into a fabrication zone above said support member and then out of said fabrication zone upon deposition of said component.

11 31. (Original) The direct write process of claim 30, further comprising a step of collecting said substrate at another side of said support member to complete a roll-to-roll fabrication process.

32. (Original) A direct write apparatus for fabricating a desired circuit component onto a substrate surface of a microelectronic device according to a computer-aided design (CAD), said apparatus comprising:

- 16 (a) a support member for supporting thereon said device substrate;
- (b) a fluid material delivery assembly comprising a chamber at a distance from said support member for containing a precursor fluid material under a substantially constant but adjustable pressure differential relative to the ambient pressure;
- 21 (c) an inkjet-based dispensing head in flow communication with said chamber, said head comprising on one end at least a discharge orifice of a predetermined size and a valve means in control relation to said at least a discharge orifice for dispensing droplets of said precursor fluid material through said orifice onto said substrate surface; and
- 26 (d) machine control means in electronic communication with a computer and in control relation to both said support member and said dispensing head for generating control signals in response to coordinates of said design of the device and for controlling the position of said dispensing head relative to said support member in response to said

1 control signals to control dispensing of said precursor material for fabricating said component.

33. (Original) The apparatus of claim 32, wherein said fluid material delivery assembly further comprises:

6 a fluid material reservoir containing therein a desired amount of said precursor fluid material,
a pump means to deliver said precursor fluid material from said reservoir to said chamber;
a back flow channel having a first end in flow communication with said chamber and a
second end in flow communication with said reservoir; and
a flow-regulating means in control relation to said channel to adjust the material back-flow
rate through said channel for maintaining a desired fluid material pressure inside said
11 chamber.

34. (Original) The apparatus of claim 33, wherein said pump means comprises a gear pump.

35. (Original) The apparatus of claim 33, wherein said flow-regulating means comprises a
needle-like valve positioned between said first end and said second end of said back flow channel
16 to adjust an effective cross-section area of said back-flow channel through which said fluid
material can back flow to said reservoir.

36. (Original) The apparatus of claim 33, wherein said flow-regulating means comprises a
spring.

21 37. (Original) The apparatus of claim 35, further comprising an actuator means in control
relation to said needle-like valve for adjusting the position of said needle-like valve relative to
said back flow channel.

38. (Currently amended) The apparatus of claim 32, wherein said fluid material delivery
assembly further comprises:

a material reservoir providing said fluid material to said chamber,

1 a compressed air source exerting a pressure to said reservoir;
a back flow channel having a first end in flow communication with said chamber and a
second end in flow communication with said reservoir; and
a flow-regulating means in control relation to said channel to adjust the material back-flow
rate through said channel for maintaining a desired fluid material pressure inside said
6 chamber. [[.]]

39. (Original) The apparatus of claim 32, 33, or 38, further comprising a substrate feeder
disposed at one side of and at a distance from said support member for feeding said substrate onto
said support member.

11 40. (Original) The apparatus of claim 39, further comprising a substrate collector disposed at
another side of and at a distance from said support member for collecting said substrate therefrom
upon deposition of said component.

41. (Original) The apparatus of claim 39, wherein said feeder comprises a roller.

42. (Original) The apparatus of claim 40, wherein said collector comprises a roller.

43. (Withdrawn) An inkjet printhead-based fluid dispensing apparatus, comprising:

- 16 (A) a fluid material reservoir;
(B) an inkjet printhead body comprising therein a chamber having a first end in flow
communication with said reservoir and receiving a fluid material therefrom and on a
second end a discharge orifice for discharging a fluid material therethrough;
(C) a valve means in control relation to said discharge orifice; and
21 (D) a back-flow channel having one end in flow communication with said chamber and
another end in flow communication with said reservoir.

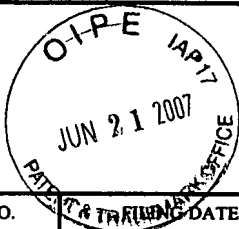
44. (Withdrawn) The inkjet printhead-based fluid dispensing apparatus of claim 43, wherein
said printhead body comprises a solenoid valve body and said valve means comprises an

1 electromagnetic valve.

45. (Withdrawn) The inkjet printhead-based fluid dispensing apparatus of claim 43, wherein said valve means comprises either a piezo-electric actuator or a thermal actuation element.

46. (Withdrawn) The inkjet printhead-based fluid dispensing apparatus of claim 43, wherein said back-flow channel is controlled by a flow-rate regulator means.

6 47. (Withdrawn) The inkjet printhead-based fluid dispensing apparatus of claim 46, wherein said flow-rate regulator means comprises a needle valve.



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,287	07/15/2003	Wen C. Huang		9971

7590 02/27/2007
Nanotek Instruments Inc
9436 Parkside Dr
Centerville, OH 45458

EXAMINER

KASENGE, CHARLES R

ART UNIT	PAPER NUMBER
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2125

MAIL DATE	DELIVERY MODE
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02/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Attachment # 6

Notice of Abandonment

Application No.

10/619,287

Examiner

KASENGE, CHARLES R

Applicant(s)

Wen C. Huang

Art Unit

2125

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address—

This application is abandoned in view of:

1. ☐ Applicant's failure to timely file a proper reply to the Office letter mailed on _____.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.
(A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☐ No reply has been received.
2. ☒ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$_____ is insufficient. A balance of \$_____ is due.
The issue fee required by 37 CFR 1.18 is \$_____. The publication fee, if required by 37 CFR 1.18(d), is \$_____.
 - (c) ☒ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The reason(s) below:

AG

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.



Attachment #7

IN THE US PATENT AND TRADEMARK OFFICE

Application No.: 10/619,287

Filing date: 07/15/2003

First Named Inventor: **Wen C. Huang**

Application Title: **DIRECT WRITE PROCESS AND APPARATUS**

Examiner: **Charles R. Kasenge**

Art Unit: 2125

March 6, 2007

Technology Center handling the above-identified patent application
Commissioner for Patents, P. O. Box 1450
Alexandria, Virginia 22313-1450

Subject: **Petition To Withdraw Holding of Abandonment Based On Failure To Receive
Office Action (MPEP 711.03(c) II and 37 CFR § 1.181)**

Dear Sir/Madam:

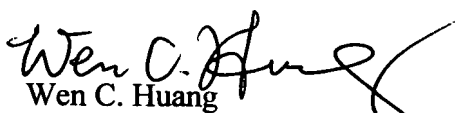
Responsive to the *Notice of Abandonment* mailed on 02/27/2007, I hereby request the Office to please withdraw holding of abandonment based on failure to receive the original *Notice of Allowance and Fees*.

The applicant hereby attests to the fact that an Office communication concerning allowance and issue fee was not received. The applicant has had a limited number of patent applications over the last six years. I have maintained all the records of each patent application in a separate file folder. I have searched all the folders and could not find the original *Notice of Allowance and Fees* for this patent application. I only found other earlier communications (10/10/2006 or earlier).

My last communication with the Examiner was on October 10, 2006 in response to the Office Action mailed on 09/26/2006 (which indicated that claims 1-31 were allowed, but other claims were either objected to or rejected). In that last communication, I provided additional evidence and justifications to request that the Office re-consider those claims rejected or objected to. Since October 10, 2006, I have been anxiously waiting to hear further from the Office, hoping that additional claims would be allowed. Much to my surprise, instead of another Office communication to notify me of the Office's further decision, I received a *Notice of Abandonment* today. As an inventor, I am most interested in getting this patent application approved as soon as possible. I would have been most delighted to pay the issue and publication fees immediately had the notice of allowance been received.

Your approval of my request to withdraw holding of Abandonment shall be greatly appreciated. Please re-mail the *Notice of Allowance and Fees* to me and I will respond and pay the necessary fees immediately.

Respectfully,


Wen C. Huang

9436 Parkside Drive, Centerville, Ohio 45458 (937) 903-0136

faxed to USPTO
on 03/07/2007

Attachment # 8

mailed

04/09/2007

along with

form PTO/SR/64

(10-05)

Petition for
Revival

IN THE US PATENT AND TRADEMARK OFFICE

Application No.: 10/619,287

Filing date: 07/15/2003

First Named Inventor: Wen C. Huang

Application Title: **DIRECT WRITE PROCESS AND APPARATUS**

Examiner: Charles R. Kasenge

Art Unit: 2125

March 31, 2007

Attention: Office of Petitions

Mail Stop Petition

Commissioner for Patents, P. O. Box 1450
Alexandria, Virginia 22313-1450

Subject: Revival of an application for patent abandoned unintentionally under 37 CFR 1.137(b)

Dear Sir/Madam:

When visiting the USPTO PAIR-Direct website on March 4, 2007, the Applicant was shocked to realize that the above-identified patent application was abandoned due to failure to pay the issue fee. As a matter of fact, the Applicant has never received a notification from the Office to pay an issue fee for this patent.

My last written communication with the Examiner was on October 10, 2006 in response to the Office Action mailed on 09/26/2006 (which indicated that claims 1-31 were allowed, but other claims were either objected to or rejected). In that communication, I requested the Office to re-consider those claims rejected or objected to. As an inventor, I was most interested in getting this patent application approved as soon as possible. Since October 10, 2006, I have been anxiously waiting to hear further from the Office. I have never received an issue fee payment notice. **Any delay or failure in paying the issue fee was unintentional.**

I contacted the Examiner on March 6, 2007 by phone to obtain more information about the case. Mr. Kasenge kindly told me to file this petition and also told me that the total issue/publication fee is \$1000. I have herein enclosed a check in the amount of \$1,000 for the issue fee and publication fee and another check in the amount of \$750 for the petition fee.

Your approval of my request for revival of this patent application shall be greatly appreciated.

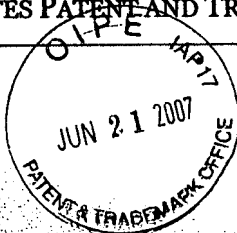
Respectfully,

Wen C. Huang

9436 Parkside Drive, Centerville, Ohio 45458 (937) 903-0136



UNITED STATES PATENT AND TRADEMARK OFFICE



Attachment # 9
Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Nanotek Instruments Inc
9436 Parkside Dr
Centerville, OH 45458

COPY MAILED

MAY 01 2007

OFFICE OF PETITIONS

In re Application of
Wen C. Huang
Application No.: 10/619287
Filing or 371(c) Date: 07/15/2003
Title of Invention: DIRECT WRITE
PROCESS AND APPARATUS

DECISION ON
PETITION

This is a decision in response to the Petition To Withdraw Holding of Abandonment Based on Failure To Receive Office Action, filed March 7, 2007. Applicant also filed a petition to revive the application under 37 CFR 1.137(b), on April 12, 2007. A Decision on the petition to revive the application will be held in abeyance pending resolution of the petition to withdraw the holding of abandonment.

This Petition is hereby **dismissed**.

Any further petition must be submitted within TWO (2) MONTHS from the mail date of this decision. Extensions of time under 37 CFR 1.136(a) are permitted. The reconsideration request should include a cover letter entitled "Renewed Petition under [insert the applicable code section]." This is **not** final agency action within the meaning of 5 U.S.C. § 704.

The above-identified application became abandoned for failure to timely and properly reply to the Notice of Allowance and Issue Fee Due, mailed November 1, 2006. The Notice set a non-extendable three (3) month period for reply. No reply having been received, the application became abandoned on February 2, 2007. A Notice of Abandonment was mailed February 27, 2007.

Petition under 37 CFR 1.181

Applicant files the instant petition and asserts that he did not receive the Notice of Allowance and Notice of Allowability.

Applicable Law, Rules and MPEP

The MPEP 711.03(c)A, Petition To Withdraw Holding of Abandonment Based on Failure To Receive Office Action, provides

In Delgar v. Schulyer, 172 USPQ 513 (D.D.C. 1971), the court decided that the Office should mail a new Notice of Allowance in view of the evidence presented in support of the contention that the applicant's representative did not receive the original Notice of Allowance. Under the reasoning of Delgar, an allegation that an Office action was never received may be considered in a petition to withdraw the holding of abandonment. If adequately supported, the Office may grant the petition to withdraw the holding of abandonment and remail the Office action. That is, the reasoning of Delgar is applicable regardless of whether an application is held abandoned for failure to timely pay the issue fee (35 U.S.C. 151) or for failure to prosecute (35 U.S.C. 133). To minimize costs and burdens to practitioners and the Office, the Office has modified the showing required to establish nonreceipt of an Office action. **The showing required to establish nonreceipt of an Office communication must include a statement from the practitioner stating that the Office communication was not received by the practitioner and attesting to the fact that a search of the file jacket and docket records indicates that the Office communication was not received. A copy of the docket record where the nonreceived Office communication would have been entered had it been received and docketed must be attached to and referenced in practitioner's statement.** For example, if a three month period for reply was set in the nonreceived Office action, a copy of the docket report showing all replies docketed for a date three months from the mail date of the nonreceived Office action must be submitted as documentary proof of nonreceipt of the Office action. The showing outlined above may not be sufficient if there are circumstances that point to a conclusion that the Office action may have been lost after receipt rather than a conclusion that the Office action was lost in the mail (e.g., if the practitioner has a history of not receiving Office actions). (Emphasis supplied)

MPEP 711.03(c)

Analysis

Applicant has failed to demonstrate that the office action was not received. Applicant must, in addition to stating that the Notices were not received, also state that a search of his file jacket and docket records reveals that the Notices were not received, and provide a copy of the file jacket and docket records to this Office. The petition is dismissed without prejudice. Applicant should file a Request for Reconsideration of Petition and include the necessary statements and copies of docket records and file jacket.

Further correspondence with respect to this matter should be addressed as follows:

By mail: Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

By FAX: (571) 273-8300
Attn: Office of Petitions

By hand: Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Telephone inquiries concerning this matter should be directed to the undersigned at (571) 272-3232.



Derek L. Woods

Attorney
Office of Petitions